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ON USING THE AGENDA TO INFLUENCE GROUP DECISIONS: THEORY, EXPERIMENTS, AND AN APPLICATION

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Three general claims are made in the paper. First, the agenda or groupings in which alternatives are considered for adoption or elimination is a major parameter in determining what a group will choose. Secondly, the nature of this influence is sufficiently systematic to yield to an analytical model. Finally, it is claimed that this discovery has important practical implications.

In support of these claims the paper offers a theory of the basis of the influence together with an attempt to capture this theory within a mathematical model. The results of an application of the theory to a real situation and the results of several series of experiments are reported.

ON USING THE AGENDA TO INFLUENCE GROUP DECISIONS: THEORY, EXPERIMENTS, AND AN APPLICATION[1]

Charles R. Plott[2] and Michael E. Levine[3]

When a large group must choose one alternative from among many competing alternatives, how should they proceed in the case where there is one meeting to be devoted to the decision? We know from social choice theory, Arrow [1], Sen [6], Plott [5], Fishburn [4], that there is no single "best" way to proceed. Furthermore, we know, theoretically, that the outcome of the process will depend upon the particular method used, but the amount of evidence for this proposition reflects the very limited number of attempts to validate it and is therefore sparse.

We had the opportunity to consider this problem in the case of a subgroup of a large flying club which was faced with the problem of deciding from among many competing fleets of planes which one would be available for the members to fly. The selection was to be made by a vote of the membership at a meeting and one of us was

1. Support for this research was supplied by the National Science Foundation and the Henry Luce Foundation. Special acknowledgment is due Steven Matthews, Caltech graduate student in social science, for his invaluable assistance on the project.

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responsible for devising an agenda which would allow deliberations to proceed in some orderly fashion. This is no simple task since the alternatives numbered in the thousands; there were over fifty members and tastes were strongly held (flying is a demanding and expensive recreation which tends to occupy a large proportion of its devotees' leisure time and recreational expenditures) and differed radically among members of the club.

There were many "good" procedures and no theoretically "best" procedures. Since there was no uniquely fair procedure, and we thought that different "good" agendas would produce different outcomes, we decided to adopt the "good" procedure most likely to get the group to choose the fleet of planes we considered optimum. Our motivations were mixed between feelings of scientific curiosity and a desire, all other things being equal, to have at our disposal the fleet of planes that best suited our tastes. Our experiment was rather crude since the theory was not fully developed, we were under some time pressure, and our initial data left something to be desired.

The procedure was designed and the meeting took place. Our predictions of the outcome of this procedure depended entirely upon the sequencing of issues (agenda) for discussion and balloting purposes. The group chose the fleet we wanted. Was the choice made by the group a result of our efforts or was it a happy accident? If the agenda is important, can the nature of its influence be characterized? These important questions led us to undertake a systematic investigation, the results of which we report here.

We make three general claims: first, the agenda or groupings in which alternatives are considered for adoption or elimination can be a major parameter in determining what the group will ultimately choose. Second, the nature of this influence is sufficiently systematic to yield to an analytical model. Finally, this discovery may have important practical implications.

The paper is outlined as follows: In the next, second, section we present the facts of the flying-club problem. It serves simultaneously as an application of the theory and a demonstration of the importance of the consequences of the theory. In the third and fourth sections we outline a basic theory and a model. In the fifth section we discuss the results of several pilot experiments which we used to help us refine the model and our methods of testing it. The sixth section includes our experimental design and the seventh, the results. These are of particular interest since we know of no other attempts to apply experimental methodology to problems of this nature. In the final section we supply a summary of conclusions.

II. THE FLYING CLUB: AN APPLICATION

A flying club is a nonprofit organization which purchases and maintains a fleet of airplanes for the purpose of renting them to its members. The particular group with which we were concerned is a large (relative to other clubs) subgroup of about sixty-five members of a larger flying club. Our group had flown a fleet of five to six single-engined planes for a number of years. At the time of this study, a decision had been made to replace the group's existing fleet of planes. The range of feasible choices for the group was large, because revenue from the sale of some of the aircraft together with a loan which the club could easily obtain would enable the club to purchase a wide variety of types and numbers of planes without additional capital levies[4] on the membership. What fleet of planes should the club buy?

A formal meeting of the group was called to advise the club board on the size and composition of the fleet. By that time, the

4. Dues which consisted of an $1800 deposit plus $30 per month were not affected by the choice of fleet. Dues go for the general overhead of the club, and the $1800 is used as capital. The rental rate covers the rest, including repayment of any loans.

universe of available aircraft had been narrowed by history, preliminary subcommittee meetings, and initial polling to conventional-tailed four-place Beechcrafts, conventional-tailed six-place Beechcrafts, six-place Cessnas and turbocharged six-place Cessnas. These aircraft differed in cost, speed, capacity, and configuration, and many members had strong preferences regarding them. The estimated differences in flying costs are listed on figure 1. While the ultimate decision regarding rental fees would be made by the club board of directors, who frequently decided matters independently of the expressed preferences of the group, it is safe to assume that members' expected higher costs of an aircraft would be reflected in the rental fee for the particular airplane approximately as illustrated here.

Fig. 1 Types of Airplanes Available and some of Their Prominent Features

Name	Abbreviation to be used here	Manufacturer	Seating	Est. rental rate per hour*
Bonanza A36	A	Beechcraft	6 place	31.50
Bonanza F33A	F	Beechcraft	4 place (plus)	30.00
Refurbished Bonanza E33A	E	Beechcraft	4 place	24.00
Cessna 210	C	Cessna	6 place	27.00
Cessna Turbo-210	CT	Cessna	6 place	29.00

*Estimated for a fleet of six aircraft. These rates increase as the size of the fleet increases, since satisfying peak demand for use means that storage, insurance, and capital recovery would be spread over fewer flying hours per plane.

We first specified our own preferences. Our most preferred alternative was a seven-plane fleet consisting of three Bonanza E-33As (refurbished), plus either two more refurbished Es or twp new Fs, and two Cessna 210s. Our second preference was a six-plane fleet consisting of either five refurbished E-33As (or our three Es refurbished plus two new Fs), and one Cessna 210. The E-33As were the least expensive Beechcraft alternative. If six-seat Beechcraft (A-36s) were to be included, we preferred one such aircraft to two. We like to fly a six-seat plane, but we also like to keep the cost down. Our ordering then was (where ~ indicates indifference):

1st	EEEEECC ~ EEEFFCC
2nd	EEEEEC ~ EEEFFC
3rd	EEEEEEA ~ EEEFFFA
4th	EEEEEAA ~ EEEFFAA

Our second order of business was to design an agenda that would get us what we wanted. This meant that we had to (1) estimate the pattern of preferences among the group; (2) theorize about their possible voting behavior; and (3) construct an agenda which simultaneously was "fair" and afforded us the maximum possible advantage. We estimated membership preferences as follows: A small but very influential set of people wanted several Beechcraft A-36s. This was the most prestigious single-engined Beechcraft, luxurious and expensive to own and operate. Another small but influential group consisting mainly of the club's governing board wanted Cessna 210s. This preference seems to have been related to the board's relationship with Cessna, Inc. through the dealership. Members of the board would purchase Cessnas if given any opportunity at all. Most of the group preferred to continue to fly Beechcraft, but a large segment of the membership seemed to be worried about expenses and would

probably prefer inexpensive rather than expensive alternatives. Many were also afraid that they would be forced into expensive aircraft by actions of the club or the board and so saw themselves at a disadvantage from a strategic point of view. The preferences we estimated were roughly calculated as follows:

	35%	35%	10%	3%
1st	6 or more Es and Fs*	6 or more Es and Fs	mostly As	mostly Cs
2nd	several Es and Fs with a few Cs	several Es and Fs with a few As		
3rd	several Es and Fs with a few As*	several Es and Fs with a few Cs		

*"Es," "Fs," and "As" are all varieties of Beechcraft Bonanzas. See figure 1.

Notice that our initial estimates indicated that we had a very difficult job indeed. What type of procedure should we use? We decided to use a process which involved an agenda. This would be a series of steps in which some set of alternatives would be eliminated with each step. We would then proceed to design the agenda on the hypothesis that people would follow one of two decision rules: they would either vote for the set which contained their most preferred alternative, or they would vote against the set which contained their least preferred alternative. We systematically used only the former.

The agenda we constructed is shown as figure 2. The questions, without aeronautical jargon, are as follows:

1. What type of aircraft should the primary fleet be? This was to be decided by a Borda count (point voting).
2. How many planes do we want?
3. Do we want a mixed fleet?

FIGURE 2

AGENDA GROUP 111 MEETING SEPT 20

This is the agenda for the Group 111 equipment meeting to be held Sept. 20 at 7:30 p.m. at [redacted]. Your subcommittee has tried to define a series of problems facing the group and to give you an opportunity to express your preferences in resolving them. We suggest that you take a few moments to look over this agenda and familarize yourselves with the choices facing us, then come to the meeting, participate in the discussion, and vote by show of hands on the choices presented in alternatives 2-6. We would like to present the Board with the most comprehensive possible expression of Group 111 opinion. Please come.

1. INTRODUCTION:

Availability, Type variety, Previous Depreciation problems, Needs of the Group vs. Cost, Safety, Radio Equipment.

2. PRIMARY AIRCRAFT TYPE:

PROBLEM: Survey suggests that many Group 111 members prefer that the main part of the group fleet be four-seat Bonanzas. Should these be all the same age? If so, we could sell all existing Bonanzas and buy new F-33A's or we could sell only the V and F and buy used E-33A's. If they can be different ages, should we keep our E's and add new F's? Or do we want C-210's? Previous depreciation practices may affect these choices.

INPUTS:

[redacted]: Costs and rates for new F-33A's and refurbished E-33A's. Depreciation problems.
[redacted]: Maintenance comparisons.
[redacted]: Availability and price of used aircraft.

VOTE: PRIMARY FLEET TYPE SHOULD BE:

a. All new F-33A's at about $29.00 hour;
b. Refurbished E-33A's at about $24.00 hour;
c. Mixed new F-33A's at about $28.00 hour and refurbished F-33A's at about $24.00 hour.
d. New C-210's at about $25.00 hour.

3. SIZE OF GROUP 111 FLEET:

PROBLEM: Survey suggests that membership considers present availability to be unsatisfactory. This summer we operated with a little over five aircraft available. We have based our rates on 500 hrs./yr./aircraft. With only five aircraft available, we are flying more than that. We can clearly operate six aircraft at 500/hrs./yr./aircraft. We might be able to operate seven at that rate. We almost certainly couldn't operate eight at 500. If we assume, conservatively, that a seventh aircraft would operate 400 hours and an eighth 300 hours, the question becomes, "how much availability do we want to pay for?"

INPUTS:

[redacted]: Cost increases associated with availability.
[redacted]: Alternative ways of paying for availability.

VOTE:

a. 6 b. 7 c. 8

4. SHOULD THE FLEET INCLUDE AIRCRAFT OTHER THAN THE PRIMARY TYPE?

PROBLEM: Most members indicated an occasional need for a five or six place airplane. Others indicated a desire to fly aircraft other than Bonanzas. There are advantages in scheduling, rate uniformity, majority choice, and type familiarity in keeping the fleet homogeneous. The advantages of operating more than one type include optimizing for different mission requirements and accommodating minority preferences.

INPUT:

[redacted]: Safety aspects of mixed fleets.
[redacted]: Survey input on desire for 5-place, 6-place, and mixed fleet.

VOTE: FLEET SHOULD BE:

a. All Primary type;
b. Mixture of mostly primary type and some six-place.

5. IF SOME SIX PLACE SHOULD BE INCLUDED, SHOULD THEY BE BONANZA A 36 OR 210's?

PROBLEM: Each of the two has advantages and disadvantages and different costs.

INPUT:

[redacted]: Weight and Balance and Performance comparisons;
[redacted]: Maintenance comparisons;
[redacted]: A36 costs and advantages;
[redacted]: 210 costs and advantages.

VOTE: SHOULD SECONDARY AIRPLANES BE:

a. A36 at about $37.50 hour?
b. C-210 at about $27.00 hour?

6. ADDITIONAL EQUIPMENT.

PROBLEM: It has been club policy (and probably will be in the future) to equip aircraft alike. Most of the group has indicated a preference for glideslopes, and the cost discussions so far have included them. Others have discussed DME's, radio-coupled auto-pilots (no altitude hold), and encoding altimeters (to meet Group 1 TCA requirements starting 7/1/74).

INPUT:

[redacted]: Cost and uses of equipment. Increase in cost/hour.

VOTE:

Would you like to have the following equipment if it increased cost per hour by the following amounts?

YES	NO	
____	____	DME at about $_____ hour.
____	____	Coupled autopilot at about $_____ hour.
____	____	Encoding altimeter at about $_____ hour.

7. SUMMARY AND RECOMMENDATIONS TOBE MADE TO THE BOARD

4. How many planes should be in the secondary fleet?
5. What type of aircraft should our secondary fleet be?

The formulation of each of these agenda items was important to our purpose. Furthermore, the order in which they came up was, we felt, crucial.

We were afraid that the group would choose all cheap planes if given the opportunity. So, we structured the agenda to focus first upon a "primary" fleet. If our estimates were correct the vote would go for a "primary fleet" of mostly inexpensive planes. We used a Borda count rather than open balloting because we did not want the group to become aware of the pattern of controversy and thus vote more strategically. This secret ballot would also mask the fact that there was not much sentiment for Cessna. A member basically indifferent on later votes might have been inclined against Cessnas if he thought few wanted them. On this ballot, we voted for all Cessnas in order to help forestall any impression that Cessnas were unpopular.

We figured many people wanted six four-seat planes (Es and Fs) and no six-seat planes. The second stage of the agenda pitted all those people who preferred seven or more four-seat planes and all individuals who preferred one of the mixed-fleet alternatives (who we figured preferred seven-plane fleets) against all those who wanted six four-seat planes.

The next question was, "Do we want a mixed fleet?" Here we were pitting all people who wanted any kind of mixed fleet against those who wanted all one kind. Our initial estimates led us to think that this was the critical vote. It was the one we were most worried about. That is the reason that we pitted it against all other alternatives. It was also taken by a show of hands so it would give those who wanted mixed fleets (a possible minority) a chance to register the intensity

of their preferences by debate and voting. As it turned out, nearly everyone was in favor of a mixed fleet and this item passed without even a formal vote.

For the fourth question, "How many planes in a secondary fleet?" We figured that any coalition large enough to win the "mixed-fleet" vote would be large enough to vote in at least two six-seat planes. This item did not appear on the formal agenda, but it appeared in the context of the meeting and it was voted upon.

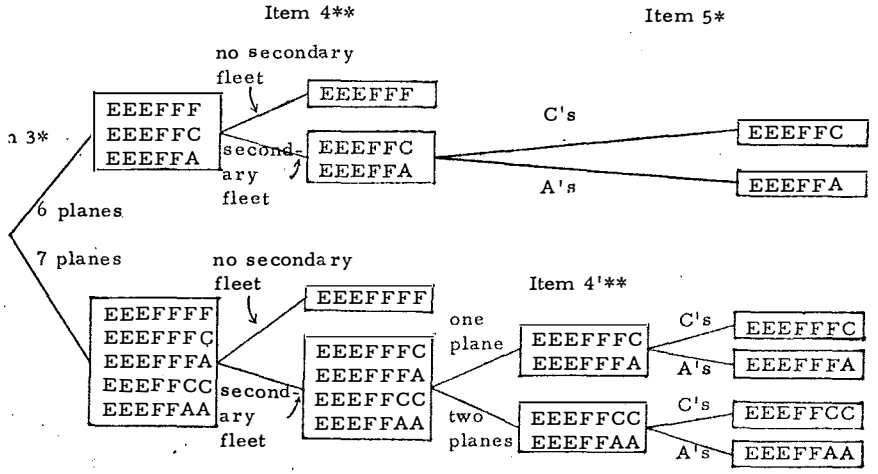
The fifth question was the type of secondary plane. We figured that the high cost of maintaining a seven-plane fleet would make members especially sensitive to costs. Given that they were going to have such a big fleet, most would be in favor of of the cheapest of the secondary alternatives -- the Cessnas.

The final question on avionics equipment was held for last. The rates go up rapidly with additional equipment. If the members had voted in favor of lots of equipment at first, expenses would have been greater and the chances of getting them to choose a seven-plane fleet would have been substantially reduced.

Figure 3 outlines the basic structure of the agenda. There it can be seen as a successive refinement of partitions. By specifying each agenda choice and determining in what order the choices shall be considered, one establishes a series of particular partitions. This partitioning is the focus of our analysis.

The meeting was held at 7:30 on September 20, 1973 -- the same time at which Bobby Riggs was playing the well-publicized tennis match against Billy Jean King. Almost half of the members attended in spite of the conflict. We took this to be a good indicator of the strength with which opinions were held. Twenty-four members were present.

FIGURE 3



*These item numbers correspond to the numbers on the original agenda.

**The formal agenda listed only item 4 but it was understood (correctly) to mean that Item 4 was to be decomposed into two stages consisting of items 4 and 4'. As it turned out no formal vote was taken on item 4 because there was no sentiment expressed at all for a nonmixed fleet. The meeting simply moved to consider item 4' directly.

The meeting was conducted in accord with the agenda. The votes on the various items are recorded on figure 5. To resolve certain administrative difficulties arising out of the meeting, the club sent a questionnaire to the members after the meeting in which they were asked to rank a great number of the alternatives. We were fortunate to get the results of the questionnaire because it allowed us to partially reconstruct the preferences which were held at the meeting. These are listed in figure 4.

From the preferences on figure 4 we can conjecture (figure 5) about how each individual voted at the meeting.

FIGURE 4

RANKINGS OF ALTERNATIVES (WITH ONE INDEXING THE "BEST") BY MEMBERS WHO ATTENDED THE MEETING

Alternative fleets	Individual Members, Indexed by Number Rather Than Name																							Majority rule order
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Our Ranking 21	22	23	24	
EEEFFF	6	3	3	7	4†	4	7	3	5†	1	4*	4*	2*	2*	5*	7	4	4	4*	5*	4	1	4	8†	8
EEEFFC	7	1	2	2	1†	8	6	1	3	2	4*	4*	2*	2*	3	8	3	1	3	5*	2	4*	7	6†	4
EEEFFA	4	2	1	5	6†	3	5	5	3	3*	4*	4*	1	2*	4	6	5*	5	4*	5*	5	3	3	3†	6
EEEFFFF	5	4*	8	8*	5†	5	8	6	4†	3*	4*	4*	2*	2*	5*	3	5*	7	4*	5*	7	4*	2	7†	7
EEEFFFC	2	4*	5	6	3†	6	4	4	3	3*	2	2	2*	2*	2	4	2	3	2	3	3	4*	5	5†	3
EEEFFFA	1	4*	4	1	7†	1	3	6	2	3*	1	3	1	2*	5*	1	5*	6	4*	1	4	2	1	2†	1
EEEFFCC	3	4*	7	3	2†	7	2	2	1	3*	3	1	2*	2*	1	5	1	2	1	2	1	4*	6	4†	2
EEEFFAA	1	4*	6	4	8†	2	1	6	2	3*	4*	4*	1	1	5*	2	5*	8	4*	4	6	4*	4	1†	5

* Individuals left this blank. All values were assumed to show indifference and ranked at the bottom.

† These were left blank by the individual. The numbers were filled in by us on the basis of comments made by the individual during the meeting and on other occasions. We feel reasonably confident in our accuracy.

FIGURE 5

Real Vote Totals on Agenda Items and Our Conjectures About Individual Voting Patterns (Marked by X) Based on Figure 4

Question: Do you want a six-plane fleet or a seven-plane fleet?

Question	real vote total	conjectured vote total	Individuals and conjectured individual votes																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Six	6	6		X	X		did not			X		X			*					X				X		
Seven	14	16	X			X	vote	X	X		X		X	X	*	X	X	X	X		X	X	X		X	X

*Ambiguous on our criteria. Counted him as abstaining which was probably accurate since he was chairman.

Question: Do you want a one-plane secondary or two-plane secondary?

Question	real vote total	conjectured vote total	Individuals and conjectured individual votes																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
One		9	X	*	X	X		X				*	X		*			X				X		X	X	
Two	13	12		*			X		X	X	X	*		X	*	X	X		X	X	X		X			X

*Ambiguous on our criteria.

Question: Do you want C-210s or A-36s as the secondary fleet?

Question	real vote total	conjectured vote total	Individuals and conjectured individual votes																							
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
C-210s	10	11		*		X	†			X	X	*	X	X			X		X	X	X	X	X	*		
A-36s	10	9	X	*	X		†	X	X			*			X	X		X						*	X	X

*Ambiguous on our criteria.

†Left the meeting. We conjecture he would have voted with the C-210s.

As can be readily determined, the conjectured vote is very similar to the actual. The basis for the conjecture is very simple. We hypothesized that the individual would vote for the set which contains his most preferred alternative regardless of the other alternatives in the set. This theory of individual voting behavior will be called the "sincere voting" strategy later in the paper and will be considered along with some other decision rules.

The votes went as follows: the basic fleet was to contain Es and Fs. This was the outcome of the Borda count and conformed to our general expectations. The vote was fourteen to six in favor of a seven-plane fleet; thirteen (a majority of those present) in favor of a two-plane secondary; and tied ten to ten between the C-210s and the A-36s as the type of secondary. The group then was tied between our first choice of five four-seat planes and two C-210s and five four-seat planes and two A-36s. Practically speaking, this was a victory for us since the board would choose the Cessna alternative.

From all indications, it looked as though our approach had worked. Several things happened which tended to reinforce this impression. The chairman of the group was a strict A-36 man (number 13 on figure 4) and seemed to be uninhibited in his efforts to use the chair to change the agenda in ways that would influence the outcome to his advantage. Here are some of the alternative agendas he attempted to use (of course we called him out of order, since our agenda had been adopted by the agenda committee):

As soon as the introductory remarks were over and before any of the items on our agenda were on the floor, he called for a vote on: "Do we want an all-Bonanza [Beechcraft] fleet?" According to our theory this motion would unquestionably pass and regardless of the later items, the club would have voted for at least one A-36 and

probably two. His motion was ruled out of order. Then after the primary fleet was decided, but before the size of the fleet was voted upon, he asked: "Do we want A-36s or C-210s as a secondary fleet?" Again, checking how the vote would have gone according to our theory we find that the group would have chosen A-36s at this stage. The ultimate choice would have been a seven-plane fleet with one A-36. This would have occurred regardless of the wording of the later items. But he was ruled out of order. Then after we determined the fleet size but before the number of planes in the secondary fleet was decided, he asked, "Do we want at least one A-36?" The answer to this question would have been yes by a vote of thirteen to eight. We called his attention to the fact that he had again deviated from the agenda and that his motion could not be taken as a substitute.

The remarkable thing about this chairman's behavior is that agenda rigging is not easy business -- for us at least. There are thousands of competing agendas. Yet he seemed to know which ones were to his advantage. Not once did he make a mistake, at least according to our theory. Could he have instinctively understood the theory which we had so laboriously arrived at?

Another indication that the agenda worked is that the Condorcet winner (the seven-plane fleet with one A-36 secondary) got knocked out by a careful grouping of alternatives against it.

III. THEORY, HYPOTHESES AND METHODOLOGICAL COMMENTS

Our basic theory is simple. The agenda influences outcomes in two ways. First, it limits the information available to individual decision makers about the patterns of preference in the group. The primary means available for preference revelation is voting, and the content of each vote is specified by the form of the agenda. In some

settings, other means of preference revelation such as verbal communication and/or straw votes can be ruled "out of order" by strict adherence to an agenda and therefore provide a limited means for information generation. In other settings, where there are many alternatives and many people, such activities may be of limited importance even when they are permitted. In addition, coordination of decisions among individuals through any type of binding agreement is nearly impossible in most meetings. This generally precludes collusive behavior unless it is the result of a pre-meeting meeting and, even then, to be effective the coalition would have to be very well informed about both the patterns of preference among the group and the agenda to be used. Thus, each individual usually finds himself in a position of decision making under uncertainty, and his behavior will be consistent with theories about decision making under uncertainty. His subjective probabilities about the actions of the group may range from favorable ("From any set, the group is likely to choose the thing I want most") to unfavorable ("From any set, the group will always choose what I want least"), but aside from such "world views," the preferences of others will have limited opportunity to influence his behavior.

Second, the agenda determines the set of strategies available to the individual. He always has the opportunity to choose among outcomes, but which outcomes he may choose among at any point is determined by the agenda. The individual always must pick the particular strategy he prefers from among those available. The agenda determines what set of strategies is available. So, by reducing the influence of others' preferences and by determining the set of strategies available to him, the agenda effectively influences the voting pattern of each individual in the group. It thereby influences the choice made by the group.

We are faced at this point with a particularly interesting problem of proof. We think that the agenda is a very important

parameter in determining the outcome of group decisions. In addition we feel we have a rudimentary understanding of the principles which serve as the bases of this influence. These will be spelled out formally in the next section. However, we are not in a position to assert that the principles we use are the principles or that our formal statement of them is entirely accurate -- we can (and do) demonstrate that they are not and it is not.

How then can we make our point about the non-neutrality of the agenda? We could attempt to do so empirically. However, it is hard to find ready-made examples like the flying club where we have a good grasp on preferences with one hand and can influence the agenda with the other. And the flying-club example is insufficient evidence by itself, since the result achieved could be explained by many competing hypotheses, none of which could be discredited with available information. To overcome these objections, we turned to experimental methods.

To experiment convincingly, we first need a group of people involved in choosing jointly between alternatives that the participants individually really care about. The theory of induced preference developed by Smith [7] seems to solve this problem. If an individual really cares about money and if the amount he is paid varies substantially with the alternative chosen by the group, and if side payments are not allowed, then we assume that he really cares individually about the decision and that his preferences can be ranked by his payoffs. Participants are not allowed to indicate in any way the magnitudes of their own payoffs since this information along with other aspects of the experimental setting tends to exert its own independent influence on preferences.

Second, we need to be able to repeat the process with the agenda changed, ceteris paribus. Keeping other things constant

tends to reassure us that the influence of the agenda has been "measured." Perhaps more important, the fewer the variables changed between experiments, the fewer the number of theories which might explain the differential results.

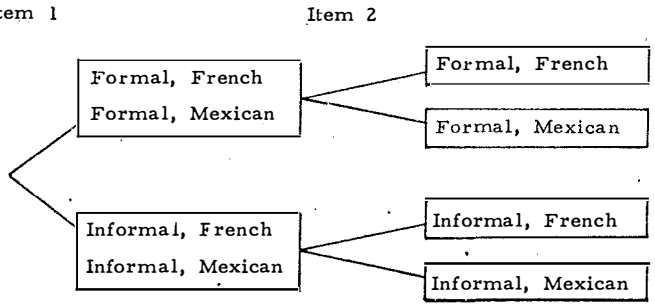
IV. THE MODEL

Our model has been developed to help us understand simplified committee processes and the possible influence of the agenda within the context of our experimental design. Although we believe that what we have learned carries over to more complex environments, we focus here only on the laboratory setting.

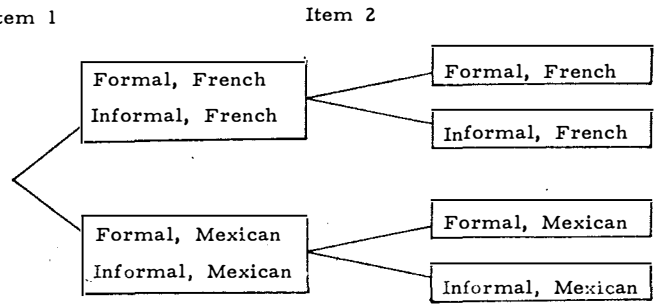
A. The Agenda

The form of agenda we used in resolving the flying club problem can be represented abstractly as a series of partitions (into two sets) of the feasible set of alternatives. Each item on the agenda was designed to eliminate some set of alternatives from further consideration. Our experimental agendas were similarly constructed.

We used the following example to explain the agenda to the experimental group during some of our experiments. Suppose that we are deciding what kind of banquet to give. The agenda reads: Item 1. Shall the dress be formal or informal? Item 2. Shall the cuisine be French or Mexican? This agenda is modeled by the following diagram:



If the items had been reversed in our example so that the vote was first on cuisine and then on attire, the agenda could be modeled as follows:



Each item on the agenda is geared to eliminate some of the alternatives which have survived the previous votes. This continues until a single alternative remains which is the choice of the group. For a fixed set of alternatives the set of all agendas corresponds to the set of all such "trees," where each "tree" which can be formed from a given set of alternatives represents a different agenda.[5]

B. Individual Preferences

Call the set of alternatives Ω. We then assign to each individual, i, a function u^i which assigns to each $x \in \Omega$ a monetary "payoff" which will be given to i in the event that x is chosen. This determines how much each separate individual will be paid (different individuals may receive different amounts) depending upon which alternative is chosen by the group. Side payments are not allowed and discussions from which one might determine the relative magnitude

5. Is it always possible to represent a "tree" so that the corresponding agenda presents a set of choices the group will find acceptable or "natural"? We occasionally had to expend considerable effort on the wording of the agendas we used and suspect that some results cannot be reached using a "natural"-appearing agenda.

of the payoffs are not allowed. Individual i will receive the amount $u^i(x)$ in the event that x is chosen by the group. He can receive no more than this; he can give none of it away; and he is the only member of the group who knows the amount of his payoff. If he prefers more money to less, we can induce in him a preference relation R^i over Ω in accord with the procedure xR^iy if and only if $u^i(x) \geq u^i(y)$.

Following the procedure above we induce individual preferences over the set of alternatives Ω. We wish to determine if there is any systematic relationship between these fixed preferences, the agenda, and the final choice made by the group.

C. Individual Voting Rules

How does an individual choose among alternatives? What decision rules will he use? We have postulated a universe of three different decision rules.

No. 1. The sincere-voting hypothesis: This hypothesis holds that an individual faced with two sets of alternatives will vote for the set which contains his most preferred alternative. If he is indifferent between the two best alternatives he then decides on the basis of a comparison between the second ranked alternatives. If he is indifferent between these two then we define the rule to be ambiguous.[6]

No. 2. The avoid-the-worst hypothesis: Here the individual votes to avoid the alternative he likes the least. When faced with a choice between two sets, he compares the least preferred alternative in each set and votes against the set which contains the worst of these two. The case of ties is treated similarly to the above.

No. 3. The average value hypothesis: This hypothesis holds that the individual treats the group choice as a lottery that will choose any

6. The hypothesis as first developed by Farquharson continues in the lexicographic fashion. An ambiguity in his procedure can occur when the sets are of different sizes. This was called to our attention by Steven Matthews.

alternative in a particular set with equal probability. The choice between two sets is like a choice between two lotteries (with uniform distribution over the outcomes) and he chooses (votes for) the one with the higher expected value. Since the payoffs of these alternatives are in terms of money, the theory says he will choose the set with the highest average payoff. The case of ties is treated as in No. 1 above.

Clearly, these three decision rules do not exhaust the set of imaginable decision rules. Any of them, for example, could be expanded to include the variance of the payoff in a set or to reflect attitudes toward risk. Any of them could be modified to include past decisions made by the group as well as subjective estimates of future decisions. Nevertheless, these rules form the backbone of our model. In the end we will conclude that the model could stand improvement. Perhaps this is one of the places where improvement can be achieved.

Our approach to the problem differs from that found in economics. We postulate the individual as a random variable over these decision rules. That is, we as experimenters do not know which rule he will use at a given point, but we are willing to speculate about the probability with which he will use a rule. In this "stochastic man" approach we are close to models which have had successful applications in marketing, Bass [2].

Some notation is needed.

Ω = the universal set of alternatives.

$\mathcal{A}$ = $(\mathcal{A}_1, \mathcal{A}_2, \ldots, \mathcal{A}_m)$ is an agenda where

$\mathcal{A}_1$ is a partition of Ω into two sets,

$\mathcal{A}_2$ is a partition of each partitionable set of the two sets of $\mathcal{A}_1$ into two sets

$\mathcal{A}_k$ is a partition of each of the partitionable sets of $\mathcal{A}_{k-1}$ into two sets.

I = the set of all individuals.

$u^i(x)$ is the monetary payoff to individual i if alternative x is chosen, $i \in I$, $x \in \Omega$.

$\mathcal{A}_i(S, \overline{S}) = \{\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \alpha_7, \alpha_8, \alpha_9\}$ = the set of "states" in which an individual may find himself relative to two sets, S and $\overline{S}$, of alternatives. These are defined as follows.

α_1 = All decision rules dictate a vote for S over $\overline{S}$; or one (or more) decision rule dictates a vote for S and the other two (or one) are ambiguous between S and $\overline{S}$.[7]

α_2 = All decision rules dictate a vote for $\overline{S}$ over S; or one (or more) decision rule dictates a vote for $\overline{S}$ and the other two (or one) are ambiguous between $\overline{S}$ and S.

α_3 = One decision rule dictates a vote for S, another dictates a vote for $\overline{S}$, and the other is ambiguous between S and $\overline{S}$; or all three rules are ambiguous

α_4 = Decision rule number 1 dictates a vote for S and both number 2 and number 3 dictate a vote for $\overline{S}$.

α_5 = Decision rule number 2 dictates a vote for S while both rules number 1 and number 3 dictate a vote for $\overline{S}$.

α_6 = Decision rule number 3 dictates a vote for S while both number 1 and number 2 dictate a vote for $\overline{S}$.

α_7 = Both decision rules number 1 and number 2 dictate a vote for S while number 3 dictates a vote for $\overline{S}$.

α_8 = Both decision rules number 1 and number 3 dictate a vote for S while number 2 dictates a vote for $\overline{S}$.

7. Ambiguity can occur if the quantity of importance is the same for both sets. If the individual was indifferent between his best alternative in S and his best alternative in $\overline{S}$, then no. 1 would be ambiguous. If the individual was indifferent between his worst element in S and the worst element in $\overline{S}$, then no. 2 would be ambiguous. If the average payoff in both sets was the same, then no. 3 is ambiguous.

α_9 = Both decision rules number 2 and number 3 dictate a vote for S while number 1 dictates a vote for $\overline{S}$.

$P_i(S, \overline{S} \mid \mathcal{A}, \alpha_k)$ = the probability that individual i will vote for the set S over the set $\overline{S}$ given that they are imbedded at some stage in agenda $\mathcal{A}$ and that he finds himself in the situation described by α_k.

Axiom 1: Independence From Environment.

The probability function $P_i(S, \overline{S} \mid \alpha_k, \cdot)$ are parameterized only by α_k and for all S, S', $P_i(S, \overline{S} \mid \alpha_k) = P_i(S', \overline{S}' \mid \alpha_k)$. This means that the individual does not act strategically by anticipating upcoming votes; his probability of voting is not affected by previous votes; his probability is not affected by discussion at any stage of the meeting, set sizes, set labels, etc. It is as though he always uses one of the decision rules above, and he chooses from among them with fixed probabilities.

Axiom 2: Stochastically Identical Individuals

$P_i(S, \overline{S} \mid \alpha_k) = P_j(S, \overline{S} \mid \alpha_k)$ for all i, j, S, $\overline{S}$, k.

This axiom postulates a certain similarity among individuals. It says that the probability that any individual votes "yes" when he finds himself in any given situation is the same for anyone who finds himself in that same situation. In addition, this axiom declares that the universe of parameters on the probability distribution is exhausted by the situations enumerated above.

D. The Strength of S against $\overline{S}$

Suppose the voting rule is majority rule and that in the agenda the set S has been pitted against the set $\overline{S}$. What is the probability that

S will win? This probability will be called the strength of S against $\overline{S}$. This can be calculated as follows.

$V(S,\overline{S},\alpha_k)$ = the set of people who find themselves in situation α_k; $\alpha_k \in \mathcal{A}(S,\overline{S})$.

$||V(S,\overline{S},\alpha_k)||$ = the number of people in the set V.

n = the total number of people [note: $\sum_{k=1}^{9} ||V(S,\overline{S},\alpha_k)|| = n$].

$$W = \left\{(x_1, \ldots, x_9): 0 \leq x_k \leq ||V(S,\overline{S},\alpha_k)||,\ x_i \in \text{integers } \forall i,\ n \geq \sum_{i=1}^{9} x_i \geq \begin{cases} \frac{n+1}{2} & \text{if n is odd} \\ \frac{n}{2} & \text{if n is even} \end{cases}\right\}.$$

$P(\langle S,\overline{S}\rangle)$ = the probability that the set S receives a majority vote over the set $\overline{S}$ in a contest between the two.

Theorem: $P(\langle S,\overline{S}\rangle) =$

(1)
$$\sum_{W} \prod_{k=1}^{9} \frac{||V(S,\overline{S},\alpha_k)||!}{(||V(S,\overline{S},\alpha_k)|| - x_k)!\, x_k!} P(S,\overline{S}|\alpha_k)^{x_k} (1 - P(S,\overline{S}|\alpha_k))^{||V(S,\overline{S}\alpha_k)|| - x_k}$$

That this is the appropriate probability can be seen by application of the binomial probability distribution, the independence assumptions and the appropriate area of summation. Notice that all we need to know to calculate this number is the number of people in each set V and the nine probability numbers represented by $P(S,\overline{S}|\alpha_k)$, $k = 1, \ldots, 9$.

E. Strength of an Agenda.

We turn now to the model of primary interest. What agenda is most likely to yield a given alternative x as the group's choice? We answer this question by calculating the strength of an agenda for

an alternative x. We do this by first calculating the probability under a given agenda that x will be the group's choice. With that formula in hand, we can then survey all possible agendas (which is incidentally no simple problem) to find the one which maximizes the chance of getting x.

Consider the agenda $\mathcal{A} = (\mathcal{L}_1, \ldots, \mathcal{L}_m)$. We assume there are m items. Each item, $\mathcal{L}_k$, you recall, partitions each set in $\mathcal{L}_{k-1}$ into two sets. The original set, $\mathcal{L}_0 = \Omega$ is the set of all alternatives. Now since the items of the agenda partition sets, each element $x \in \Omega$ appears in one and only one set S at any given item. Call this set $S(x,\mathcal{L}_k)$ and the set which is pitted against it $\overline{S}(x,\mathcal{L}_k)$.

Our previous formula (1) allows us to state the probability $P(\langle S(x,\mathcal{L}_k), \overline{S}(x,\mathcal{L}_k)\rangle)$ for any given x and any given $\mathcal{L}_k$. From the independence axioms above we know immediately then that:

(1) $P(x|\mathcal{A})$ = the probability that x is chosen by a group given that the agenda is $\mathcal{A}$.

(2)
$$P(x|\mathcal{A}) = \prod_{\mathcal{L}_k \in \mathcal{A}} P(\langle S(x,\mathcal{L}_k), \overline{S}(x,\mathcal{L}_k)\rangle)$$

This is the formula we were seeking at the beginning.

F. Influencing the Group

In order to apply the theory we face three more problems. The first involves obtaining estimates of the nine numbers $P(S,\overline{S}|\alpha_k)$, $k = 1, \ldots, 9$. The numbers we used were estimated from the pilot experiments and are provided in section VII.

The second problem involves the interesting mathematical problem of finding the optimum agenda. For each alternative we can compute the probability that it will win under any given agenda. Choice

of an agenda then will be like the choice of a lottery so in general the "best" agenda would depend upon attitudes toward risk, etc. The objective function we use simply dictates finding the α which maximizes $P(x|\alpha)$. The hard part occurs because of the very large number of potential α.

Third, we must be able to get the group to adopt and adhere to the agenda we have chosen. This involves devising an agenda which presents choices in an acceptable or "natural" way and preventing alternative motions from reaching the floor.

V. PILOT EXPERIMENTS

We conducted three series of pilot experiments prior to the series used to establish the propositions we wish to report here as final research results. There were nine pilot experiments in all (six in series one, one in series two, and two in series three) and from them we obtained two types of information: first, we estimated the probabilities $P(\bar{S}, S|\alpha_k)$, to be used for the experiments. Second, we learned a lot about experimental design in general and our procedures in particular. We describe the pilot results here. The reader interested only in our final results should skip directly to the next section.

The experimental environment was not as closely controlled during the pilot experiments as it was for the final (fourth) series. Slight variations in instructions occurred. Professor Plott chaired the meetings and might conceivably have affected the outcome of the votes.[8] The pilot experiments were not at first designed for any

8. Among the several ways this might have occurred: once several revotes were taken when it was clear that a particular individual was confused and was not giving a clear signal (hand going up and then down) as to which way he was voting. Sometimes motions were written on the board in differing ways. The chairman, who knew the desired outcome, might possibly have communicated approval or disapproval of an alternative by inflection, expression, or choice of words.

well-specified purpose, but rather (especially in series 1) simply attempted to replicate the flying club experience. Occasionally an experimental design itself caused problems. Aside from these defects, however, the overall design of the pilot experiments was very similar to the one used in series 4. Individuals (students from Pasadena City College, U. C. L. A., U. S. C. and Caltech) were asked to participate in a decision-making experiment and were told that they would be paid. Preferences were induced on an abstract set of objects. An agenda was provided. The group then discussed the items within the constraints of the experiment.[9]

A. Series One

Preferences induced for Series One are shown on figure 6. Note the similarities with the flying club example.[10] The Series One sequence consisted of six experiments in all. Figures 8 through 10 report the structure of the agendas, the probabilistic predictions of the model (computed from the data from this series), the actual vote count at meeting, and the resulting choice made by the group. Figure 7 provides the key to the figures. Each agenda reported here was designed to get some particular alternative. The model used was a simplified version of the one we later adopted and report above. These agendas are not optimal according to either model. The exception is the agenda used for series one, experiment six, which, was found by the computer and is optimal according to the original model.

9. There could be no mention of monetary rewards. There could be no side payments and no threats of actions external to the experimental setting. The agenda must be followed, etc.

10. With the F, C, A letters representing types of aircraft, the agendas are the same after the choice of basic fleet type. The following pairs (x, y) where x represents the person in figure 6, and y represents a person in figure 4, have identical orderings: (1, 4), (2, 12), (3, 18), (4, 21), (5, 1), (6, 8), (7, 9), (8, 13), (10, or 7). The other preferences were changed in a manner which would help us identify some of the possible decision rules participants used.

FIGURE 6

SERIES 1, PAYOFFS IN DOLLARS

PERSON	ALTERNATIVE							
	FFF 1	FFC 2	FFA 3	FFFF 4	FFFC 5	FFFA 6	FFCC 7	FFAA 8
1	0.50	6.00	1.00	0.25	0.75	8.00	5.50	5.00
2	0.25	0.25	0.25	0.25	5.00	4.50	8.00	0.25
3	0.55	8.00	0.49	0.40	7.80	0.45	7.90	0.29
4	3.80	7.50	3.50	0.90	4.00	3.80	8.00	1.00
5	3.00	2.00	5.00	4.00	7.00	8.00	6.00	8.00
6	6.00	8.00	4.00	3.00	5.00	3.00	7.00	3.00
7	4.00	6.00	6.00	5.00	6.00	7.00	8.00	7.00
8	1.00	1.00	8.00	1.00	1.00	8.00	1.00	8.00
9	2.00	1.00	3.00	5.00	4.00	8.00	6.00	7.00
10	2.00	3.00	4.00	2.00	5.00	6.00	7.00	8.00
11	1.00	7.50	7.40	2.00	2.00	8.00	7.00	6.00
12	2.00	8.00	2.00	7.00	6.00	5.00	1.00	7.00
13	7.00	6.00	5.00	7.00	1.00	8.00	2.00	3.00
14	3.00	2.00	2.00	7.00	1.00	8.00	7.00	6.00
15	1.00	7.00	7.00	2.00	2.00	8.00	4.40	3.60
16	7.00	7.00	1.00	2.00	3.00	3.00	2.00	8.00
17	1.00	2.00	8.00	7.00	3.00	7.00	6.00	5.00
18	7.00	7.00	6.00	8.00	5.00	5.00	1.00	6.00
19	7.00	7.00	6.00	1.00	1.00	8.00	6.00	5.00

Majority Rule Relation

FFFA (Experiments 3 and 4)

FFC (Experiment 5)

FFCC (Experiments 1 and 2)

FFA ~ FFAA (Experiment 6)

FFFC

FFFF

FFF

FIGURE 7

(x) ⟹ means that x is the strength of the set over its complement as determined by the model.

(x) ⇐ means that x is the strength of the agenda in getting this alternative. Each agenda was designed to get the alternative so marked.

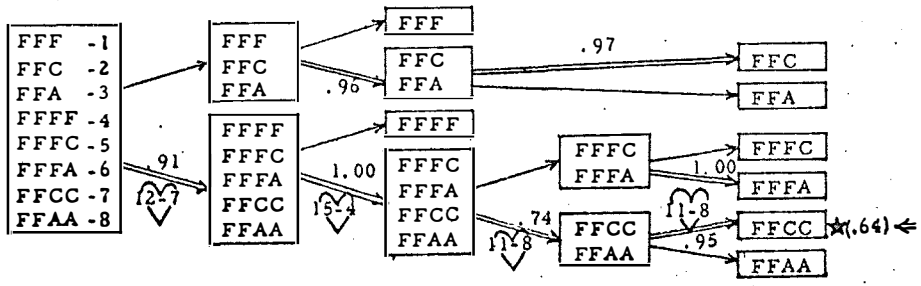
x-y means that at this stage the vote went "our way" by a vote of x to y.

x-y means that at this stage we "lost" by a vote of x to y.

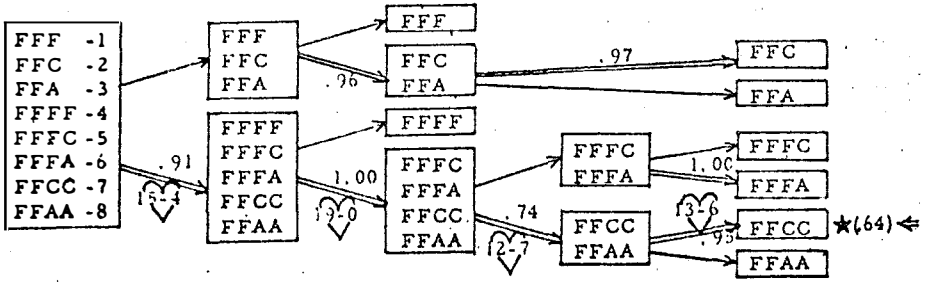
★ indicates the actual final choice made by the group.

FIGURE 8†

SERIES 1 - Experiment 1



SERIES 1 - Experiment 2



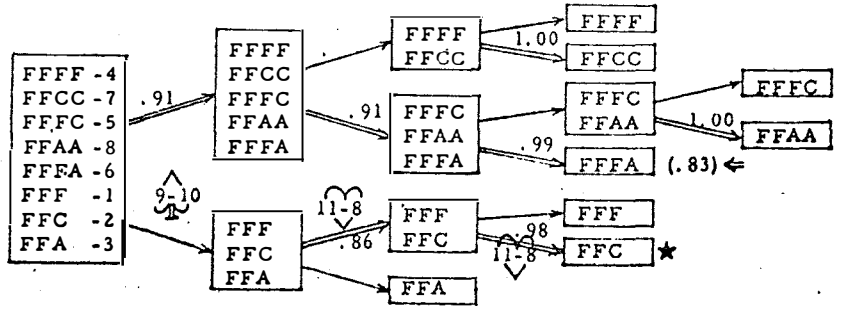
Series 1 Experiment 1 and 2: Agenda

1. Shall the selection be a three letter alternative or a four letter alternative?
2. Shall the selection be a mixed letter alternative?
3. If the selection is to be a four letter, mixed letter alternative, then shall it have two F's or three F's?
4. Shall the alternative have a C or an A?

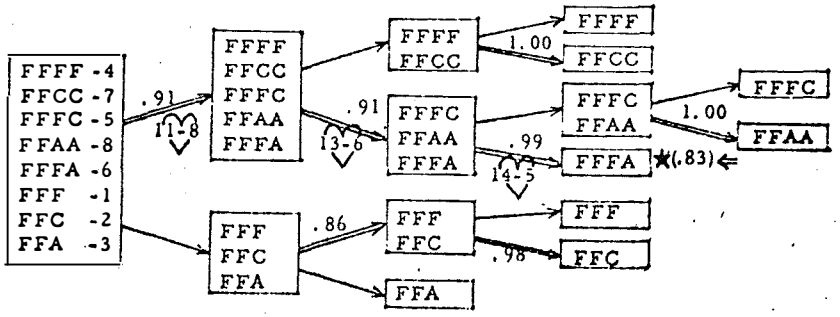
† For key see figure 7.

FIGURE 9†

SERIES 1 - Experiment 3



SERIES 1 - Experiment 4



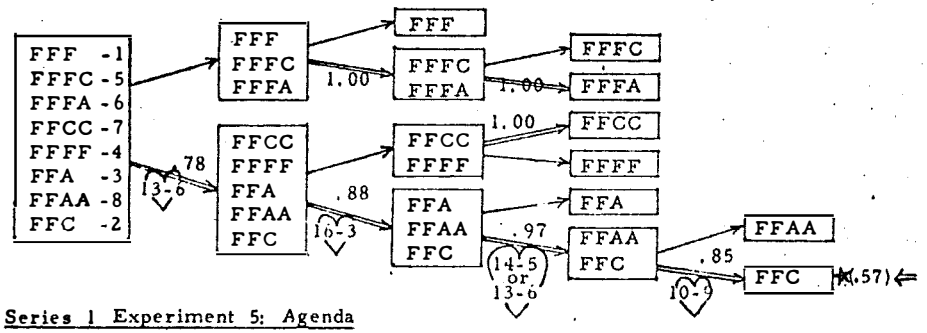
Series 1 Experiment 3 and 4: Agenda

1. Shall the selection be a three letter or a four letter alternative?
2. From the (four) (three) letter alternatives, shall the decision be from the first two or the remainder?
3. If only two alternatives remain, which shall be chosen? If more than two remain, shall the decision be from the first two or the remainder?

† For key see figure 7

FIGURE 10†

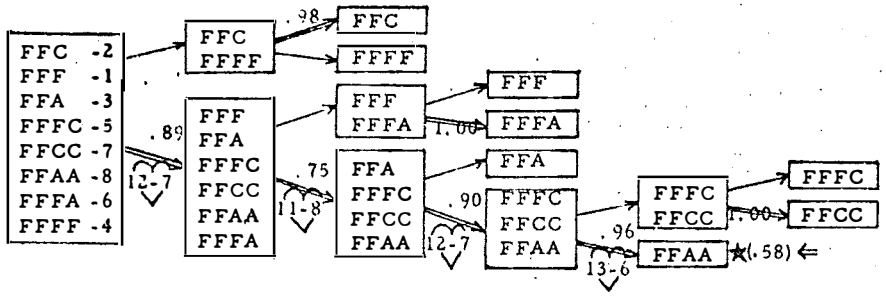
SERIES 1 - Experiment 5



Series 1 Experiment 5: Agenda

1. From these alternatives do we want one with at least three but no more than three F's?
2. Do we want a four letter alternative which contains three or more F's or a C?
3. Do we want only one A?

SERIES 1 - Experiment 6



Series 1 Experiment 6: Agenda*

1. Shall we adopt one of the two extremes or eliminate them both?
2. Of those remaining shall we adopt one of the two extremes or eliminate them both?
3. Of those remaining shall we adopt the top alternative?
4. Of those remaining shall we adopt the bottom alternative?
5. Which of the two remaining shall we adopt?

* This agenda was generated by the computer.

† For key see figure 7.

FIGURE 11

SERIES 2, PAYOFFS IN DOLLARS

PERSON	ALTERNATIVE				
	TYLE 1	LEPS 2	YEPO 3	TUPO 4	TYLS 5
1	3.75	5.50	3.00	5.25	0.25
2	3.75	5.50	3.00	5.25	0.25
3	3.75	5.50	3.00	5.25	0.25
4	3.75	5.50	3.00	5.25	0.25
5	3.75	5.50	3.00	5.25	0.25
6	3.75	5.50	3.00	5.25	0.25
7	3.75	5.50	3.00	5.25	0.25
8	3.75	5.50	3.00	5.25	0.25
9	7.50	4.00	8.00	7.25	0.25
10	7.50	4.00	8.00	7.25	0.25
11	7.50	4.00	8.00	7.25	0.25
12	7.50	4.00	8.00	7.25	0.25
13	7.50	4.00	8.00	7.25	0.25
14	7.50	4.00	8.00	7.25	0.25
15	7.50	4.00	8.00	7.25	0.25
16	7.50	4.00	8.00	7.25	0.25
17	7.50	4.00	8.00	7.25	0.25
18	7.00	7.50	6.25	8.00	0.25
19	8.00	8.25	7.00	6.00	0.25
20	8.00	7.50	6.75	5.75	0.25
21	8.00	7.50	6.75	5.75	0.25
Majority rule ordering	1st	2nd	3rd	4th	5th

In the first two experiments in this series (experiments 1 and 2), the same agenda was used (in abstract form) as was used by the flying club. The outcome of both meetings was the alternative we predicted.

Experiments 3 and 4 used identical agendas (different from the one used for 1 and 2) designed to get the Condorcet winner FFFA. The first vote of experiment 3 did not go as we predicted even though our model claimed a .91 probability. We believe this occurred because a straw vote was taken. Our model makes no allowances for straw votes, and our rules do not prohibit them.

Of the remaining alternatives, only FFC and FFAA yielded agenda with "reasonable" strength according to our first model. The agenda for experiments five and six were designed to get each respectively, As shown in figure 10 both meetings proceeded as expected.

The first six experiments (Series One) yielded a great deal of data on individual voting behavior. These data were then used to estimate the probability numbers (reported in section VII) needed for the model outlined above. With these in hand, we decided that the first task would be to demonstrate that within a laboratory environment the agenda can systematically influence a group's decision. Both the following two series began as attempts to provide such a demonstration but were aborted because of inadequacies in experimental design.

The payoffs of Series Two were constructed so that we could, theoretically, get four out of the five alternatives with very high probability and demonstrate theoretically that it was impossible (using the agenda alone as a parameter) to get the fifth. The payoffs, agenda and agenda strengths are shown on figure 11. These agenda strengths were calculated on the basis of data obtained in series one.

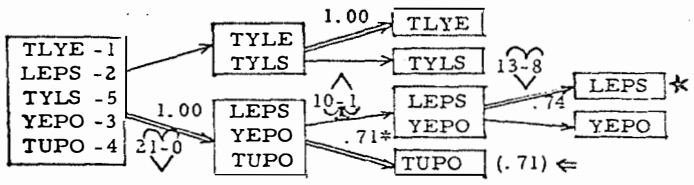
SERIES 2. AGENDAS

Item number	Item Statement	Pr(TLYE) = .89	Pr(LEPS) = .94	Pr(YEPO) = .94	Pr(TUPO)
1	Do we want to consider further only those alternatives which contain a x_1 or do we want to consider further only those alternatives that do not contain a x_1?	$x_1 = S$	$x_1 = T$	$x_1 = L$	$x_1 = P$
2	Of the alternatives remaining, do we want to consider further only those alternatives that contain a x_2 or do we want to consider further only those alternatives that do not contain a x_2?	$x_2 = Y$	$x_2 = L$	$x_2 = T$	$x_2 = E$
3	Of those alternatives remaining do we want the alternative which contains a x_3 or do we want the alternative which does not contain a x_3?	$x_3 = T$	$x_3 = S$	$x_3 = S$	$x_3 = S$

FIGURE 12†

SERIES 2 - Experiment 1

(Numbers correspond to numbers in experiments of Series 3.)



* Using Series 1 frequency data only from PCC instead of pooled data, this probability becomes .14! This experiment was run at PCC.

† For key see figure 7

This series was terminated after the first experiment (the results of which are recorded on figure 12) for three reasons. First, the participants of this experiment seemed confused. We thought that the labeling may have been partly responsible. This could have been remedied, but that would have involved a change in instructions and experimental procedures which would have been equivalent to terminating the series. Second, we had decided to use a "neutral" chairman who was not aware of the purposes of the experiment. This was his first experience, so the meeting did not go especially smoothly. Third, we felt the payoffs for some alternatives were so close that some subjects may have been indifferent. Greater differentiation would assure us that the preferences were those we wanted to induce. Our concern was a product of the fact that the strengths of these agenda are very sensitive to the probability parameters we used.

The design of Series Three was essentially that of Series Two (the payoffs in Series Three were affine transformations of those in Series Two) except for one major exception which proved disastrous. For the first time in any of our work we adopted an artifical scenario. Subjects were told that they were at a meeting of chocolate pizza manufacturers who were deciding among competing advertising programs. The payoffs (listed here in figure 13) in their instructions were to be taken to be the profits that would accrue to them individually from the institution of the various programs (see the instructions in appendix I). These changes were made in order to facilitate group discussion and to make the setting more "realistic" along certain dimensions.

The series was aborted after the first two experiments (the results are in figure 13). We discovered after the second experiment that many individuals thought we were trying to learn something about advertising strategies and completely ignored the payoffs in order to help us out. The scenario apparently called their attention to the experimental setting and encouraged the subjects to speculate on its

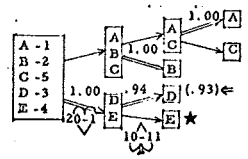
purpose. In addition some subjects indicated strong favorable or unfavorable reactions to some alternatives regardless of their payoffs. Since we no longer could be certain of the subjects' preferences we could not expect the models to work. For some examples, see the last page in Appendix I. The difficulties might be worth eliminating in future experiments designed to test the practical limitations of our theory, but to establish the basic hypothesis, we adopted the design used in Series Four. It is this design that is reported in detail in the next section.

FIGURE 13†

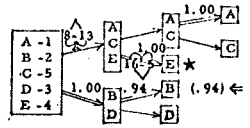
SERIES 3, PAYOFFS IN DOLLARS

	ALTERNATIVE				
	A	B	D	E	C
PERSON	1	2	3	4	5
1	5.75	8.50	4.75	8.25	0.25
2	5.75	8.50	4.75	8.25	0.25
3	5.75	8.50	4.75	8.25	0.25
4	5.75	8.50	4.75	8.25	0.25
5	5.75	8.50	4.75	8.25	0.25
6	5.75	8.50	4.75	8.25	0.25
7	5.75	8.50	4.75	8.25	0.25
8	5.75	8.50	4.75	8.25	0.25
9	7.50	4.00	8.00	7.25	0.25
10	7.50	4.00	8.00	7.25	0.25
11	7.50	4.00	8.00	7.25	0.25
12	7.50	4.00	8.00	7.25	0.25
13	7.50	4.00	8.00	7.25	0.25
14	7.50	4.00	8.00	7.25	0.25
15	7.50	4.00	8.00	7.25	0.25
16	7.50	4.00	8.00	7.25	0.25
17	7.50	4.00	8.00	7.25	0.25
18	7.00	7.50	6.25	8.00	0.25
19	8.00	8.25	7.00	6.00	0.25
20	8.00	7.50	6.75	5.75	0.25
21	8.00	7.50	6.75	5.75	0.25
Majority rule order	1st	2nd	3rd	4th	5th

SERIES 3 - Experiment 1



SERIES 3 - Experiment 2



† For key see figure 7

VI. EXPERIMENTAL PROCEDURES

Our subjects were college students recruited from Caltech, the University of Southern California and the University of California at Los Angeles. An announcement was made in classes about the opportunity to participate in a "decision-making experiment." They were told that they would attend a meeting which would last approximately an hour, discuss some issue which had no political overtones and that they would have the opportunity to make "well over the hourly wage which any of them might be receiving." They were told that the experimenters were interested in certain logistical and technical problems about group decision processes; that there was no interest in psychological variables or personal variables; and that they would be subject to no harm or embarrassment.

Meetings took place in a classroom beginning at noon. As participants arrived they were assigned to seats in accord with a function which resulted from a random number table. When all participants were seated, they were asked to read the instructions which had been placed face down on their desks.

The instructions were read by the experimenter[11] who did not know at the time which alternative the agenda was designed to produce. These are included here as appendix II.[12] After reading the instructions the experimenter answered any questions, turned the meeting over to the chairman and seated himself at the back of the room. He said nothing during the remainder of the experiment except when voting took place. He then stood up and recorded votes.

11. Sometimes there were two experimenters present. Only one ever read the instructions or otherwise spoke before the group.

12. Note the wording of the agenda was exactly the same for the first two and it was the same for the last two. The reason is because the index of any alternative varied between experiments. Thus the alternatives which were labeled B were numbered 3, 2, 5, and 5 for experiments one, two, three, and four respectively.

The chairman for Series 2, 3, and the final Series 4 was a Caltech senior majoring in physics. He was paid $4.00 per hour. He was given the instructions labeled "chairman's instructions" in the appendix. He was not told the purposes of the experiment or that we had any expectations about which alternatives the group might choose. In the debriefing which occurred after the final experiment, it was evident that he did not know the purposes of the experiments and did not suspect that the agenda was a key variable.[13]

The only person present during the experiment who was aware of which alternative was, theoretically, supposed to occur was the graduate research assistant, Steven Matthews. He was introduced along with the chairman, as a recording secretary. The only things he said during the meetings were functional to the general task of recording votes.

The chairman's first task was to go through the agenda. He proceeded in three steps. First, he explained an abstract example (see his instructions in the appendix; also see the figure at p. 24 above) of how an agenda operates. This example, which involved the choice of a banquet, and the real agenda were put on the chalkboard before the experiment and remained there after he was finished. He then went through the details of the agenda to be used during the meeting, answering all questions relating to procedures. Finally he instructed participants to answer the questions on the last page of their instructions. When they had finished, he then went through the "test" to see if anyone had answers which "differed from his," i.e., were wrong.

13. When told the purpose of the experiments, he responded, "I never thought of the agenda as the point of the experiments. I realized the same basic tree was used throughout, but I do not understand how the outcome could be predicted reliably even knowing the payoffs." He had chaired seven experimental meetings.

This last feature we found to be very useful. On several occasions during our pilot experiments we had reason to suspect that participants did not fully understand the agenda and/or motions. After we adopted this test, mistakes seldom occured.

After the procedures had been fully discussed, the meeting began. The chairman took up the first item on the agenda and opened the floor for discussion. We asked him to encourage discussion on the first item. Participants tended to be a little hesitant to speak up ("What can I say about an A?"), but once discussion started, they often were moved to comment on something.

After the first item was voted upon, the group considered the next item on the agenda. On two or three occasions someone asked if items could be changed. This was not allowed. We suspect that certain types of straw votes are effectively changes in the agenda and may affect outcomes. Although we never prohibited a straw vote, we were prepared to rule one out of order if it was put in the form of a substitute agenda; e.g., "If it comes down to box A versus box B later, how many will go for A?" We did allow one straw vote in this series and we think it did affect the outcome (see p. 36).

When the meeting was over, all subjects were paid in cash the amount dictated by their payoff sheet and the alternative chosen by the group. There were never any complaints.

VII. EXPERIMENTAL RESULTS

A. The Influence of the Agenda

The payoff schedules used are listed on Figure 14. The majority rule relation is also shown there. Alternative No. 1 beats all others in any binary contest and alternative No. 5 is beaten (unanimously) by any of the others in a binary contest. The other three alternatives are involved in a cycle. We would have preferred to avoid this cycle, however we were unable to find a noncyclic example for

which a probability one agenda could be constructed according to our model for each feasible[14] item, given the probabilities measured from series 1.[15] Our experience with the last two series had taught us not to take chances. We chose the less "jazzy" ordering in order to get a better probability for the result we wanted.

The results of these experiments are in Figures 15 and 16. Experiments 1, 3, and 4, which were designed to get alternatives 3, 2 and 1 respectively, performed exactly as anticipated. Each resulted in the choice of alternatives for which the agenda was designed.

The agenda for Experiment 2 was designed for alternative 4, but the group chose alternative 1. This resulted because a straw vote revealed the fact that alternative 5 (labeled D in this experiment) was least preferred by all individuals. Does this call into question the basic assumptions of our model? We think not. This straw vote, we claim, effectively changed the agenda to the one on the figure labeled "Alternate Specification: Series 4 - Experiment 2." For this alternate agenda the model predicts letter E, the one actually chosen, with a .93 probability. Suppose now we have only two theories:

Θ_0: The outcome of the process does not depend upon the agenda. That is, there exists a probability distribution $P(x)$ over outcomes $x \in \Omega$ which is not functionally dependent upon the agenda, although it may depend on other parameters.

Θ_1: The outcome of the process does depend upon the agenda. That is, there exists a probability distribution $P(x \mid \Omega)$ over outcomes $x \in \Omega$ which is functionally dependent upon the agenda in addition to other parameters.

---

14. Alternative 5 is impossible.

15. The probabilities $P(S, \bar{S} \mid \alpha_i)$ as measured from series 1 are:

α_1	α_2	α_3	α_4	α_5	α_6	α_7	α_8	α_9
.96	.04	.50	.38	.17	.61	.39	.83	.62

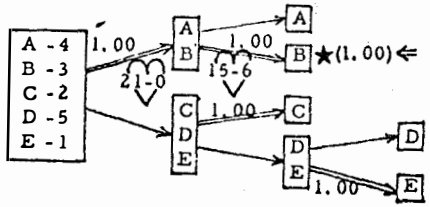
Figure 14

SERIES 4, PAYOFFS IN DOLLARS

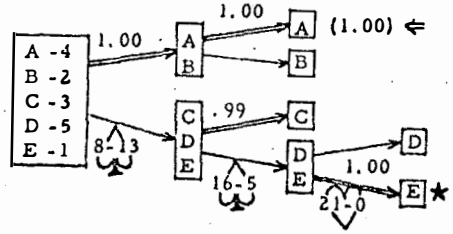
PERSON	ALTERNATIVE				
	1	2	3	4	5
1	6.00	7.00	5.00	8.00	0.50
2	6.00	7.00	5.00	8.00	0.50
3	6.00	7.00	5.00	8.00	0.50
4	6.00	7.00	5.00	8.00	0.50
5	6.00	7.00	5.00	8.00	0.50
6	6.00	7.00	5.00	8.00	0.50
7	7.50	7.75	6.75	5.75	0.25
8	7.50	7.75	6.75	5.75	0.25
9	7.50	7.75	6.75	5.75	0.25
10	7.50	7.75	6.75	5.75	0.25
11	7.50	7.00	6.00	8.00	0.50
12	8.00	7.50	7.00	6.00	0.50
13	8.00	7.50	7.00	6.00	0.50
14	8.00	7.50	7.00	6.00	0.50
15	7.00	5.50	7.50	6.50	0.25
16	7.00	5.50	7.50	6.50	0.25
17	7.00	5.50	7.50	6.50	0.25
18	7.00	5.50	7.50	6.50	0.25
19	7.00	5.50	7.50	6.50	0.25
20	7.00	5.50	7.50	6.50	0.25
21	7.00	5.50	7.50	6.50	0.25
Majority rule relation	1 ← 2 ⇄ 3 ⇄ 4 ← 5				
	1st		cycle		last

Figure 15†

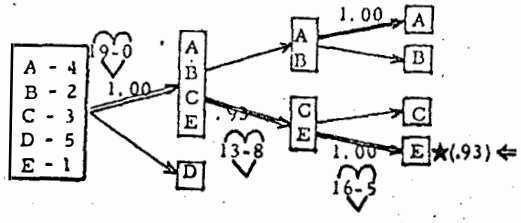
SERIES 4 - Experiment 1



SERIES 4 - Experiment 2



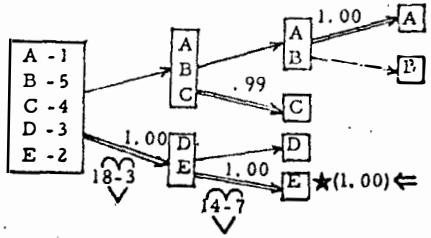
Alternative Specification: SERIES 4 - Experiment 2'



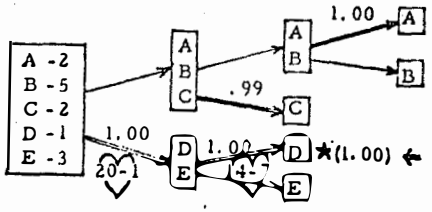
† for key see Figure 7

Figure 16†

SERIES 4 - Experiment 3



SERIES 4 - Experiment 4



† for key see Figure 7

Our initial beliefs about the truth of θ_0 or θ_1 were heavily skewed in favor of θ_1 as result of all the pilot experiments. We assume a critic would be much more skeptical. The a priori probabilities we postulate as:

Ours	Our critics
$P(\theta_0) = .1$	$P'(\theta_0) = .8$
$P(\theta_1) = .9$	$P'(\theta_1) = .2$

In addition we assume that our critic holds the theory that $P(5|\theta_0) = 0$ and for $x \neq 5$, $P(x|\theta_0) = \frac{1}{4}$ (the probability that alternative 5 occurs is zero and all others are equally likely).[16] He agrees with us that alternative 5 cannot result. If he takes any position other than that the rest are equally likely then our task would be to repeatedly induce the group to choose the least likely according to his beliefs.

Even if θ_1 is true, we do not have 100 percent confidence in our model. We would still say that those events predicted by the model to have a probability of .90 or over have real probabilities of only about .7 of those of the model. That is, for those x that the model predicts that we can obtain with a probability of .9 or more, we predict.

$P(x|\theta_1) = .7 \times$ probability predicted by the model.

We adopt our critics' belief as to the probability of x for the case where θ_0 is true. We assume also that our critic has no more confidence in our model than we do for the case where θ_1 is true. We assume his beliefs about our model are the same as ours, since having less faith in our model than we do would ultimately hurt his argument for the truth of θ_0.

Our beliefs in light of the results are:

$P(\theta_1) = .9980$

$P'(\theta_1) = .9330.$

---

16. The distribution most likely to give the observed result is $P(1|\theta_0) = 1/2$, $P(2|\theta_0) = P(3|\theta_0) = 1/4$, $P(4|\theta_0) = P(5|\theta_0) = 0$. With this null hypothesis $P'(\theta_1)$ below becomes .8362.

We are almost 100 percent sure that the agenda matters and our critic is .93 sure.

If our critic would not allow our explanation of Series 4 Experiment 2, then a repetition of the argument above would show that he has learned much less from Series 4 and we would have learned nothing. Since the cost of an additional experiment is about $170 (and since any critic can study the pilot runs), we elected not to try to convince this critic until we found a setting within which we could learn something additional ourselves. We conclude that the agenda influences the outcome.

B. The Validity of the Model

Even though our general theory may be right, the specific means of expressing or modeling it that we have developed is probably wrong. We assert this on three grounds.

First, the model made a probability one prediction which did not occur. This was the Series 4, Experiment 2 experience. While it is true that that event could easily be explained within the bounds of our theory, the model itself leaves no room for such adjustments. We must either claim that the model applies only in the absence of straw votes or we must adequately develop the model to allow for the influence of straw votes. Changing the predictions to correct for straw votes is unsatisfactory.

Secondly we can, from Series 4, test the values of two of the parameters. During this series, 52 votes were cast from state α_1 (where all three rules dictate the same vote), and of these 50 were cast in the direction dictated by the three decision rules. These constitute 52 Bernoulli trials with a probability P of success. The hypothesis that P = .96, the number used in the model, is accepted at the .01 level of significance. This is particularly interesting since it indicates that when individuals are in certain circumstances, our model of individual decisions is very good indeed. Psychological

or other theoretical modifications are unnecessary. When all three rules cast compatible decisions, almost all behavior is explained.

In addition to those cast from a position of state α_1, there were 32 votes cast from α_9 of which 27 were cast in the proper direction. According to the model these constituted 32 Bernoulli trials, each of which had a probability P of going in the proper direction. The hypothesis, P = .62, the value used in the model, is rejected at the .01 level of significance. From this we know that the model as presently structured is not perfect. There is definitely room for improvement in the parameter values.

We have one final test which can be reported which begins to answer the question "How well does the model predict the votes?" Figure 17 provides a comparison between the actual vote and the predicted vote for each item of each experiment including all pilot series. The most significant thing about this table is the apparent conservatism in the model suggested by the very infrequent instances of the actual vote falling short of the expected vote (eight out of 40 cases). This conservatism shows up again on the histogram of figure 18. If the theoretical distribution of votes for each item was normal then the histogram should approach a normal distribution curve. But, for all items the theoretical distribution of votes was significantly skewed to the left (as shown by $3\sqrt{\mu_3}$ on the table). Since the histogram is strongly skewed to the right, the accuracy of the model is in even more doubt than the non-normality of the histogram suggests. We suspect that this is a type of "bandwagon effect" but we have not rigorously tested for this.

Figure 17

TABLE : DISTRIBUTION OF OUTCOMES **

Series Experiment Item	Mean of win† votes μ	Standard deviation σ	$\sqrt[3]{\mu_3}$	No. of win† Votes x	$(x-\mu)/\sigma$	Prob. of direction actually taken	Prob. of final outcome
1-1-1	11.57	1.67	-.48	12	.257	.90	.65
1-1-2	13.83	1.16	-.71	15	1.01	1.00	
1-1-3	10.84	1.71	-.65	11	.094	.79	
1-1-4	10.85	.95	-.47	11	.158	.93	
1-2-1	11.57	1.67	-.48	15	2.06	.90	.65
1-2-2	13.83	1.16	-.71	19	4.46	1.00	
1-2-3	10.84	1.71	-.65	12	.679	.79	
1-2-4	10.85	.95	-.47	13	2.27	.93	
1-3-1*	10.85	1.67	-.48	9	-1.54	.10	.08
1-3-2	10.54	1.15	-.41	11	.400	.83	
1-3-3	12.20	1.38	-.62	11	-.869	.97	
1-4-1	11.57	1.67	-.48	11	-.341	.90	.82
1-4-2	11.48	1.37	-.69	13	1.11	.93	
1-4-3	12.37	1.16	-.65	14	1.40	.99	
1-5-1	11.00	1.59	-.78	13	1.26	.83	.58
1-5-2	11.17	1.52	-.34	16	3.18	.87	
1-5-3	12.21	1.48	-.72	13	.534	.97	
1-5-4	10.40	1.05	-.40	10.5	.095	.82	
1-6-1	11.03	1.43	-.45	12	.679	.86	.61
1-6-2	10.58	1.46	-.64	11	.288	.78	
1-6-3	11.21	1.16	-.77	12	.682	.93	
1-6-4	12.62	1.42	-.88	13	.267	.98	
2-1-1	19.49	1.14	-.94	21	1.32	1.00	.07
2-1-2*	13.34	1.90	-1.11	10	-1.76	.07	
2-1-3	11.85	1.00	-.48	13	1.15	.92	
3-1-1	17.42	1.64	-1.10	20	1.58	1.00	.08
3-1-2(Item 5)*	11.85	1.00	-.48	10	-1.85	.08	
3-2-1*	19.26	1.21	-.98	8	-9.33	.00	.00
3-2-2	17.19	1.69	-1.13	16	.706	1.00	
4-1-1	18.34	1.44	-1.04	21	1.85	1.00	1.00
4-1-2	13.65	1.00	-.64	15	1.35	1.00	
4-2-1*	17.65	1.59	-1.09	8	-6.08	.00	.00
4-2-2*	16.73	1.78	-1.16	5	-6.59	.00	
4-2-3	19.95	.99	-.87	21	1.06	1.00	
4-2'-1	12.73	1.27	-.77	13	.213	.96	.96
4-2'-2	13.65	1.00	-.64	16	2.35	1.00	
4-3-1	17.65	1.59	-1.09	18	.220	1.00	1.00
4-3-2(Item 3)*	13.65	1.00	-.64	14	.350	1.00	
4-4-1	17.42	1.64	-1.10	20	1.58	1.00	1.00
4-4-2	13.65	1.00	-.64	14	.350	1.00	

†"win" means that vote went in the direction indicated most probable by the model.

*These experiments did not result in the anticipated outcome.

**Data were pooled from all experiments except 1-3, 3-2, 4-2, 4-2'.

Figure 18

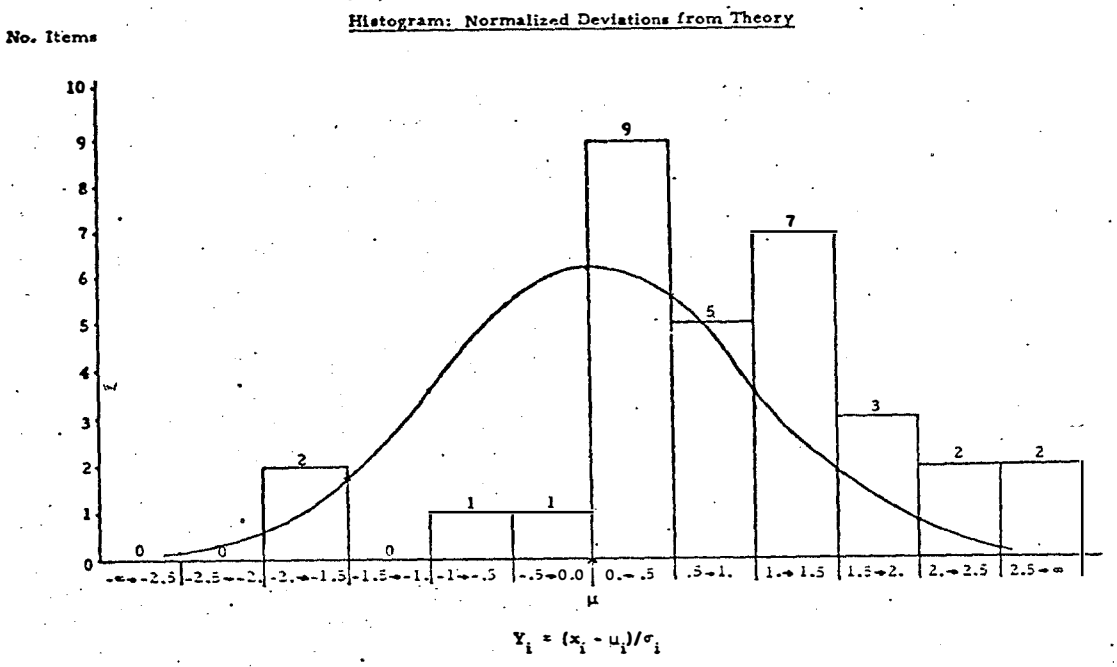


Figure 19

CONSISTENT USE OF VOTING RULES

Series and Experiment Number	Number of individuals in Y* whose behavior was consistent with Rule No. 1	Number of individuals in Y* whose behavior was consistent with Rule No. 2	Number of individuals in Y* whose behavior was consistent with Rule No. 3	Number of individuals in Y* whose behavior was consistent with none of the three rules	Number of individuals in Y*
1 - 1	1	1	6	2	10
1 - 2	4	1	1	4	10
1 - 3	0	0	0	1	1
1 - 4	0	0	6	0	6
1 - 5	1	0	1	2	4
1 - 6	1	0	3	2	6
Total	$\frac{7}{37} = .19$	$\frac{2}{37} = .05$	$\frac{17}{37} = .46$	$\frac{11}{37} = .30$	37

Rule 1 = Sincere; Rule 2 = worst avoidance; Rule 3 = average value.

Y* = the set of individuals for which the consistent use of any of the three voting rules would have been inconsistent with the consistent use of either of the other two voting rules.

C. Individual Voting Rules

Of particular interest to us were the patterns of individual decisions. Does an individual always use the same decision rule? If this were the case, we could considerably improve upon the accuracy of the model but we do not yet have much data. Of the 261 individuals who participated in these experiments, only thirty-seven were involved in a series of voting situations which would necessarily[17] reveal the individual's voting rule. Figure 19 indicates that 70 percent of these thirty-seven subjects exhibited consistent behavior. The average value hypothesis was the most popular with about 46 percent of these subjects using it. The next largest group, 30 percent, used none of these rules consistently. If these proportions are characteristic of the population at large, then it may be possible to improve the model by using the behavior exhibited on the first item to calculate the strength of later items. The fact, however, that so many individuals did not consistently use any of the rules suggests that some sort of probabilistic treatment of individual decision rules may always be necessary.

VIII. CONCLUDING REMARKS

Our research has incorporated several features not found (at least all in one place) in the economics and politics literature. First, our characterization of voting procedures is different from that found in the social-choice and voting literature. With the exception of Farquharson [3], research in those areas has been focused on processes in which alternatives are considered in a series of binary (two at a time) contests. The voting procedure we study involves voting between

17. Any individual from among the thirty-seven who consistently used any of the three rules would have exhibited behavior inconsistent with the use of either of the other two rules.

sets of issues. Our theory is decision theoretic in origin, but we depart from the traditional decision-theoretic mode of analysis by treating individuals as random variables over decision rules. Our approach is similar to the theory being developed by Bass [2] in which preferences are treated as stochastic. A third unusual feature of this study was our access to so many parameters in a process as complicated as the flying club meeting.

Finally, our choice of an experimental methodology is certainly not typical of modes of analysis used by economists. Our posture is simple. If by using our ideas about the influence of the agenda, we are unable to influence the decisions of groups in a simple laboratory setting, then we cannot in good faith claim that our theory worked in the more complicated case of the flying club. We look to the laboratory to reject our hypotheses about a real-world event. In a sense, this is a negative posture. We can never really know what caused the flying club decision. We can only reject alternative explanations by repeated application of our methodology.

What are the possible implications of what we did and of what we think we might learn to do? Can the agenda of any committee which follows Robert's Rules of Order be modeled along the lines we outlined? We think the answer is, generally not. Most such bodies have rules which allow for changing the agenda itself as well as rules which allow for the possibility of recalling previously eliminated alternatives. But the order and phrasing of motions and amendments under Robert's Rules or other similar parliamentary procedures is clearly susceptible to analysis using our model. And some deliberative bodies, such as the U.S. House of Representatives, allow subgroups such as the Rules Committee to create agendas for floor votes that are difficult to change. Others, such as international conferences, decide first on agendas, before proceeding to "substance." We have not yet specified the class of real-world processes which use agendas of the form we use. We are still working on it.

If there are many real-world analogs to the processes we have modeled, our research raises important ethical and practical issues. Casual observation suggests that processes are accepted as legitimate because they are thought to allow decisions to be based on the substantive merits of the alternatives presented. Procedures are expected to be dominated by substance. But if there is no outcome which the group "wants" independently of the procedure used to reach the decision, all we can do is choose an acceptable agenda which dictates the final result. Such a situation, if established, would clearly require a rethinking of our attitudes toward decision procedures. Interpreted least skeptically, our research so far suggests that there are such situations (the flying club decision) and that some people (the flying club group chairman) are able to intuit which procedural decisions will work to their advantage and use them. If this is true, then those of us who are less talented might function more successfully if the factors influencing the outcomes of group decisions were more generally known.

One might surmise that we presume too much in raising such issues because once the influence of the agenda is known to the participants in a group decision, it will cease to affect them. If correct, this is an argument for pursuing and desseminating results such as ours. But we suspect that many of the outcomes we reached in our experiments would have been reached by a group that was familiar with the principles involved, once any given agenda had been adopted. Should further experimentation confirm our suspicions, we can only speculate about the difficulties knowledgeable groups may have in solving the infinite regress of determining an agenda for deciding on an agenda.

There is no need to take a Machiavellian posture and assume that our results are only useful in attempts to control people. Once the

influence of the agenda is generally understood, we can use the knowledge to gain insights into the way complex group processes actually function and refine our attitudes toward them. Our untested suspicion is that institutions frequently cause groups to take positions as a result of some inadvertant procedural decision rather than because of facts and preferences. More generally, pursuing this line of inquiry may enable us to recognize the limitations of the processes we use to make group decisions and to "design around" them to the extent possible. Further research may enable us to specify accurately the universe of decision procedures not subject to agenda influences, thus facilitating process selection.

All this emphasizes the importance of finding out more about the phenomenon we are investigating. Our experiments were simple; the real world is complex. In the real world, groups debate alternatives which lend themselves to argument and discussion. Argument and discussion may involve appeals to general principles which create conflicting preferences in individual participants. The personalities of individual participants may exert positive or negative influences on the votes of other members of the group. Leadership, charisma, and feelings of deference may give the preferences of one individual more weight in the process than the preferences of others. Previous group history may influence events. Agenda items may be recharacterized or perceived differently by the introduction into the discussion of facts or projections. Finally, feelings of "fairness," either in the form of attachment to certain processes or of limits to the effects of outcomes on other individuals in the group, may exert important influences on decisions. The experimental environment may have suppressed many of these effects. These and other real-world features remain to be investigated. But the very fact that experimental results could suggest such inquiries highlights the potential importance of even our limited findings.

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APPENDIX I

INSTRUCTIONS AND OTHER MATERIAL
RELATING TO SERIES THREE

INSTRUCTIONS FOR COMMITTEE MEMBERS

1. We are interested in certain technical aspects of the way committees operate. You have been asked to participate in a committee process experiment which might help us understand certain aspects of these generally complex processes. Support for this research has been supplied by the National Science Foundation and the Henry Luce Foundation.

2. You are the president and owner of a small company that specializes in processing and selling a food specialty item (chocolate pizza). There are twenty-one similar firms in the state. Each firm sells and delivers only in its own area so there is no competition between firms. There is substantial competition, however, from producers of closely related products.

   You are currently attending a meeting of a trade association organized and maintained by the firms. The association performs several valuable services and has for several years been considering the expansion of services to the advertising field. Prospects and alternatives have been carefully researched and everyone agrees that some sort of state-wide advertising program should be undertaken. The purpose of this meeting is to decide upon the specifics of the program.

   Many alternative programs have been proposed and debated over the years. Research and compromise have narrowed the options to five competing programs. Choice from among these five is to be decided by majority vote of the members.

   Your staff members have studied the competing programs and their characteristics carefully. From this study they have determined the value of each program in terms of your net profit. These figures are not generally known and for antitrust reasons should not be discussed. Furthermore, these figures can differ from company to company because advertising which appeals to customers of some firms can have a negative appeal to the customers of other firms.

3. The purpose of the meeting is to decide by majority rule which one of the five advertising programs shall be used by the trade association. Only one of the five will be chosen, and the payment you will receive depends entirely on which one it is. For example, on the table on p. 3, the amount listed under "net value" for program A is the amount you will receive if it is chosen; the amount listed under "net value" for program B is the amount you will receive if it is chosen; etc. You will be paid in cash immediately after the meeting. You must not reveal any quantitative information about your payment. These payments differ among committee members. Only you are to know anything about how much you may receive.

4. The committee must follow some rules of order. The basic procedure will be majority rule. Aside from that, we will follow some rather common parliamentary rules. These will be reviewed by a chairman who has been asked to conduct the meeting.

   In many groups it is common for the decision to be made using an agenda prepared by the chairman or a rules committee. For this committee the agenda is on the attached page. Study this agenda so you will understand how the business will proceed. It will be covered in detail by the chairman.

5. Here are some incidentals:

   a. You are asked to fill in the appropriate blank spaces under each item. These serve as a record of your vote and the way you understand the motion at the time of voting.

   b. In addition to your written record we will ask a recording secretary to record each vote. This can take some time so we ask you to hold your hand high until all votes are recorded.

   c. Remember you are not to mention monetary amounts. In addition, before or during the experiment, please do not discuss with other participants any activity to take place after the experiment which may involve you jointly. Under no circumstances may you make either threats or "deals" to split your payoff from the meeting with another participant.

6. Do you have any questions?

Committee Member No. _____

Program	Proposing Agency	Unifying Theme	Primary Medium	Primary Endorser	Free Samples	Major Magazine	$ Net Value
A	Gotham Co.	yes	sky-writing	Andy Granatelli	no	Mad Magazine	
B	Gotham Co.	no	bathroom walls	Andy Granatelli	yes	Action Comics	
C	Gotham Co.	yes	sky-writing	Olga Korbutt	no	Action Comics	
D	Metropolis Inc.	no	sky-writing	Andy Granatelli	yes	Mad Magazine	
E	Metropolis Inc.	yes	bathroom walls	Olga Korbutt	yes	Mad Magazine	

THE AGENDA

Item 1. Which advertising agency should we use? (Check choice and fill in both blanks).

_____I am in favor of considering further only those programs proposed by Gotham Co. (_____) fill in.

_____I am in favor of considering further only those programs proposed by Metropolis, Inc. (_____) fill in.

Item 2. Shall the program have a unifying theme? (Check choice and fill in both blanks).

_____ Of the programs remaining, I am in favor of considering further only those programs which have a unifying theme. (_____) fill in.

_____ Of the programs remaining, I am in favor of considering further only those programs which do not have a unifying theme. (_____) fill in.

Item 3. Which major magazines should be used? (Check choice and fill in both blanks).

___ Of the programs remaining, I am in favor of considering further only those programs which use Mad Magazine as the major magazine. (_____)fill in.

____ Of the programs remaining, I am in favor of considering further only those programs which use Action Comics as the major magazine.

RESPONSES WHICH INDICATE UNCONTROLLED INCENTIVE STRUCTURE SERIES 3 EXP. 2

5.75 .25 8.25 ←	"I think unifying theme is more effective."
8.50 4.75	
5.75 .25 ←	"Because Gotham Co. program is cheaper and probably more effective."
8.25	
5.75 .25 8.25 ←	"A small group of companies would have a greater impact on the consuming public with a direct, easily remembered theme than with a less concentrated approach."
8.50 4.75	
7.50 .25 ←	"I wanted skywriting because I can't imagine bathroom walls as an effective media."
7.50	

APPENDIX II

INSTRUCTIONS USED IN SERIES FOUR

CHAIRMAN INSTRUCTIONS

You are employed to serve as chairman of several committee meetings. The time and location of these meetings are on the attached page. Each meeting will last about forty-five minutes. You should be at the designated location thirty minutes before the meeting starts and you should have familiarized yourself with the rules of order which are attached. For your participation you will be paid five dollars per hour plus any necessary expenses, e.g. parking, which you incur.

These meetings are part of a series of experiments designed to test theories about decision processes. Beyond this introductory remark, you will not be made aware of the purposes of the experiments until after the entire series has been completed. You should avoid talking with anyone about <u>any</u> aspects of the experiments, your employment, or about any possibly related theories. You should avoid circumstances in which you might inadvertantly become informed. Do not try to guess the nature of the hypotheses or supply your own theories. After the final meeting you will receive a detailed explanation.

The first thing to do is check the dates and the times. Make sure you can be there. They are listed here as "Attachment No. 1."

Attachment 2 is a copy of the instructions that members of the committee will receive. You should read these instructions now.

Here are some things that should be underlined:

1. People are free to say anything they wish which pertains to the motion on the floor. If discussions are "out of order," you can make that judgment. In particular, the following are not to be allowed:
   a) Statements which contain dollar or quantitative references;
   b) Straw votes on issues other than the current issue to be discussed and voted upon, as will be explicitly described on the agenda; and
   c) Threats or dealings between committee members to be carried through during or after the experiment is over.
2. "Majority rule means a majority of those present. A vote passes if it receives eleven or more votes. If an item on the agenda fails both votes, you call for more discussion. After discussion another vote is taken. If neither passes you move to the next item on the agenda. An ambiguity after all items on the agenda are covered, can be resolved by a motion from the floor.

PARLIAMENTARY RULES FOR CHAIRMAN

Read the appropriate portions at the appropriate times.

<u>Recognition rule</u>: Raise you hand to be recognized by the chair.

<u>Voting rule</u>: The basic voting rule is simple majority rule. An issue passes if it passes by a majority of those voting.

<u>Rule to break ties</u>: (read this if necessary) If a tie vote occurs discussion of the motion is again opened. After debate a second vote is taken. If a tie occurs again debate is opened again and a vote is taken. If a tie occurs again the committee moves to consider the next issue. Any ambiguity at the end of the last item can be removed by a motion from the floor.

<u>Rule to end debate</u>: If someone wishes to end the debate on an item they simply move to end debate. If there is no objection to ending debate the item is voted upon.
(Read if necessary)
If there is objection to ending debate the motion to end debate will be recognized by the chair. A vote on the motion to end debate will be taken. If it passes by 2/3 majority of those voting the debate ends. If the motion to end debate fails, debate on the main motion continues.

Agenda:

The agenda committee has adopted the agenda which is before you. Notice that each item on the agenda is designed to restrict the number of programs which may receive further consideration.

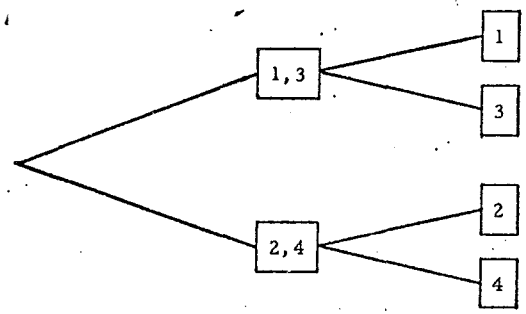
Example: Choice of a banquet

Alternative No.	Type of Food	Dress
1	Mexican	Formal
2	Mexican	Informal
3	French	Formal
4	French	Informal

Item 1. Shall we have a formal dress banquet or not? Notice that an answer to this question will restrict further deliberation to either

[1,3] or [2,4]

Item 2. What type of food? Notice that an answer to this question is now all that we need to decide upon a specific alternative.



INSTRUCTIONS FOR COMMITTEE MEMBERS

1. We would like for you to participate in a committee process experiment. The purpose of the experiment is to help us understand certain technical aspects of the generally complex ways in which committees operate. Support for this research was supplied by the National Science Foundation and the Henry Luce Foundation.

2. All you have to do is to attend a committee meeting and for this participation you will be paid. The purpose of the meeting is to choose by majority rule a letter from the set of letters [A, B, C, D, E]. Only one of the five letters will be chosen and the payment you receive for participation depends entirely upon which one it is. For example, on the table on p. 3, the amount listed beside the letter A is the amount you will receive if it is chosen by the committee; the amount beside B is the payment you will receive if it is the majority decision, etc.

   Different individuals will receive different payoffs depending upon which letter the committee chooses. The letter which would result in the highest payment to you may not result in the highest payment to someone else. You should decide after deliberation how you wish the committee to vote and make whatever efforts you might want to get the vote to go that way. However, in general, we as experimenters are not concerned with whether or how you participate in the committee's effort to select a letter.

We want the meeting to proceed in an orderly fashion so we have provided a few parliamentary procedures which must be followed. These will be explained by the chairman. We also want to make sure that you understand the consequences of your votes and any resulting committee decision. For this purpose we ask you to answer the questions on p. 4 after the chairman has reviewed the rules and the agenda.

3. Here are some incidentals:
   a. The basic procedure will be simple majority rule. We will also follow the agenda prepared by an agenda committee. This agenda is outlined on p. 3 and should be studied carefully. It will also be covered by the chairman.

   b. You will from time to time be voting. We have appointed a recording secretary to record all votes. This can take some time so we ask you to hold your hands high until all votes are recorded.

   c. You will be paid in cash immediately after the meeting. You may not reveal any quantitative information about your payment. You can if you wish say that one yields more than another but you may not say how much more. The amounts may differ among committee members and only you are to know anything about how much you may receive.

   d. Before or during the meeting please do not discuss with other committee members any activity to take place after the meeting which may involve you jointly. Under no circumstances may you make threats or "deals" to split your payment from the meeting with another committee member.

4. Are there any questions?

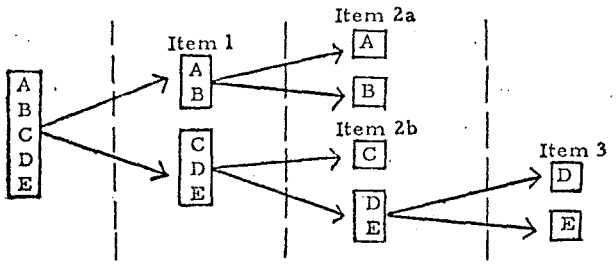
SERIES 4 EXPERIMENTS 1 AND 2

Individual Payment and Agenda Section of Individual Instructions

Committee Member _____

Letter	Payment to you
A	
B	
C	
D	
E	

AGENDA



Item 1. Do we want to consider further only the letters A and B or only the letters C, D, and E? (Check your vote)

_____ I am in favor of considering further only the letters A and B.
_____ I am in favor of considering further only the letters C, D, and E.

Item 2a. (If the letters A, B are chosen at Item 1 then this item is applicable - if not then go to 2b.) Which do we want, A or B?

_____ I am in favor of A.
_____ I am in favor of B.

Item 2b. (If the letters C, D, and E are chosen at Item 1 then this item is applicable - otherwise go to 2a.) Do we want to consider further only the letters D and E or do we want to stop with C?

_____ I am in favor of C.
_____ I am in favor of considering further only the letters D and E.

Item 3. Do we want D or E?

_____ I am in favor of D.
_____ I am in favor of E.

SERIES 4 EXPERIMENTS 1 AND 2

Agenda Test Section of Individual Instructions

1. Suppose the top box at Item 1, the one that contains the letters A and B, received a majority of the votes. Then, the next item to be considered on the agenda is _____, and it consists of a vote between the letter(s)_____ and the letter(s)_____.

2. Suppose at Item 1 the box of letters that contains the letters C, D, and E is chosen by a majority. Then the next item to be considered on the agenda is _____, and it consists of a vote between the letter(s)_____ and the letter(s)_____.

3. If the box of letters that contains A and B received a majority vote at Item 1, would there be a vote at Item 3? Answer Yes or No_____. If it happened that the box of letters containing C, D, and E received a majority of votes at Item 1, and a vote was not needed at Item 3, then the box containing the letter_____ must have received the majority of votes and thus would be the committee's final choice.

4. If at each item the lower arrow was followed by the majority of votes, then the committee will have made_____ the final choice and you will receive the amount_____ as your payoff.

5. How much will you receive if the committee's final choice is

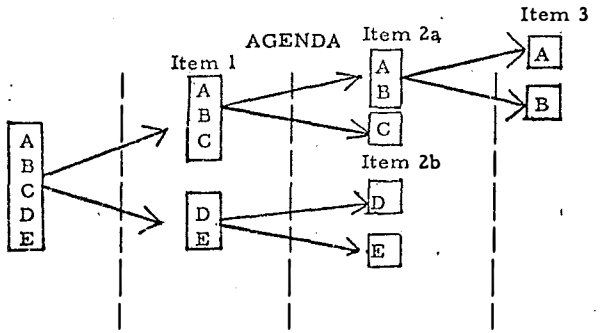
D?_____ B?_____ C?_____ A?_____

SERIES 4 EXPERIMENTS 3 AND 4

Individual Payment and Agenda Section of Individual Instruction

Committee Member No. _____

Letter	Payment to you
A	
B	
C	
D	
E	



Item 1. Do we want to consider further only the letters A, B, and C or only the letters D and E? (Check your vote)

_____ I am in favor of considering further only the letters A, B, and C.
_____ I am in favor of considering further only the letters D and E.

Item 2a. (If the letters A, B and C are chosen at Item 1 then this item is applicable -- if not then go to 2b.) Do we want to consider further only the letters A and B or do we want to stop with C?

_____ I am in favor of considering further only the letters A and B.
_____ I am in favor of C.

Item 2b. (If the letters D and E are chosen at Item 1 then this item is applicable -- otherwise go to 2a.) Which do we want, D or E?

_____ I am in favor of D.
_____ I am in favor of E.

Item 3. Do we want A or B?

_____ I am in favor of A.
_____ I am in favor of B.

SERIES 4 EXPERIMENTS 3 AND 4

Agenda Test Section of Individual Instruction

1. Suppose the top box at Item 1, the one that contains the letters A, B, and C received a majority of the votes. Then, the next item to be considered on the agenda is _____, and it consists of a vote between the letter(s)_____ and the letter(s)_____.

2. Suppose at Item 1 the box of letters that contains the letters D and E is chosen by a majority. Then the next item to be considered on the agenda is _____, and it consists of a vote between the letter(s)_____ and the letter(s)_____.

3. If the box of letters that contains D and E received a majority vote at Item 1, would there be a vote at Item 3? Answer Yes or No_____. If it happened that the box of letters containing A, B, and C received a majority of votes at Item 1, and a vote was not needed at Item 3, then the box containing the letter _____ must have received the majority of votes and thus would be the committee's final choice.

4. If at each item the lower arrow was followed by the majority of votes, then the committee will have made _____ the final choice and you will receive the amount _____ as your payoff.

5. How much will you receive if the committee's final choice is

D? _____ B? _____ C? _____ A? _____